Soil Conservation

June 1979

U.S. Department of Agriculture

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From the Administrator

A Fresh Opportunity; A Fresh Challenge

A new strategy for USDA conservation programs is now being built from:

- The most public suggestions we have ever received;
- The most natural resource data we have ever reviewed; and
- The most thorough process for linking program direction to appraisal findings ever undertaken.

In August, the "first draft" of a Resources Conservation Act (RCA) program—and the appraisal on which it is based—will go out for extensive public review. It will be a fresh opportunity for conservation districts and others to shape the conservation programs, policies, and priorities of USDA agencies. It will be a fresh challenge for districts and for USDA employees to encourage citizens and organizations to again make their views known.

Public participation last year was excellent; more than 160,000 Americans expressed their concerns by letter, by formal comment, or in person at over 8,700 RCA meetings.

It has been quite a job to compare what each citizen said with others' comments, with detailed analyses of many sets of physical data, with likely benefits and costs, and with political realities. The ideas turned out to be good ones—and the concerns are very real.

From them can emerge a comprehensive set of both new and old approaches and programs, as well as a new vote of confidence in many of the present efforts.

The RCA draft program and appraisal will need just as thorough a look as the first questions had last summer. A number of different means for public input will be provided, to be sure that as many voices as possible help chart the future.

An important result of RCA will be the development and strengthening of local and State soil and water conservation programs. More than $6 million in RCA funds has been granted the past 2 fiscal years for that and other purposes—and State soil and water agencies and individual districts are putting the money to effective use. They are being aided by sample outlines for long-range programs that a special task force of the National Association of Conservation Districts (NACD) prepared.

What is the final test for efforts at all levels? As one sample NACD outline says, "The effectiveness of a conservation program must be measured by its ability to encourage private landowners to take needed conservation action."

With the leadership and support of so many full partners in the RCA process, I am convinced we will pass that test.

Mel Davis

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Soil Conservation

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Front cover:
Quail and other wildlife are depending more and more on landowners' developing habitat. Many conservation plants, such as shrub lespedezas, can be established to furnish food and cover for wildlife. (See article beginning on page 4.)

Back cover:
Research Roundup (see pages 18 and 19) includes an item on predicting wind erosion protection of range grasses.

by Cluster R. Belcher
and W. Curtis Sharp

Tasty Lespedezas

Wildlife, especially quail, find food and cover in some shrub lespedezas, which also protect eroding areas.

Lespedeza bicolor is the most common shrub lespedeza. Since ordinary bicolor won't grow in all quail country and has other limiting factors, newer strains of lespedeza, such as 'Natob' and 'VA–70', have been developed.

Farm game, such as the bobwhite quail, depends more and more each year upon landowners' developing habitat rather than relying on nature to supply its needs.

The farm economic squeeze has forced landowners to intensify their farming operation. This has led to the elimination of many natural hedgerows, weedy fence rows, and other areas which provide good game habitat. The farmer interested in game now looks more to odd areas—such as fence corners and bare strips between fields and woodland—on which to develop wildlife habitat.

Some species of shrub lespedezas make good-quality food and furnish cover for quail. These legumes, which supply their own nitrogen after the first year, can also provide cover for eroding areas.

Biologists have found that quail like the seeds of shrub lespedezas and that, fortunately, sparrows, blackbirds, doves, rats, and mice, which destroy many grains and other bird foods, do not like them.

The most common of the shrub lespedezas is *Lespedeza bicolor*. But since ordinary bicolor won't grow in all quail country, biologists and plant specialists have developed a more hardy strain called 'Natob'. It can be grown farther north because its seeds ripen earlier than other shrub lespedezas and its stems are more winter hardy. Natob is recommended where the growing season is 145 days or longer and the first frost is September 25 or later. Its seed yield is about 350 pounds per acre in most parts of this recommended area.

A strain of another shrub lespedeza, *Lespedeza thunbergii*, has been selected which produces mature seed in areas with 165 frostfree days and the first killing frost is September 25 or later. It is called 'VA-70', has good vigor, and equals or exceeds Natob lespedeza in seed yield.

Hunters like VA-70 because the leaves fall from the plant by the beginning of the hunting season. The plants then form a screen, not a blind.

Although leaf drop occurs near the time of the first killing frost, its effectiveness as a conservation plant is not lost. The fallen leaves form a mulch that usually remains on the ground throughout the winter. The mature seeds fall into this mulch and lie there until they are eaten or are no longer useful for wildlife food.

VA-70 was selected in the early 1950's by Karl Graetz at the former Soil Conservation Service Sandy Level Nursery in Gretna, Va. It produced the most seed of any strain tested, up to 500 pounds per acre, and was the earliest flowering.

VA-70 lespedeza attains a height of 6 to 7 feet. The foliage is attractive during the vegetative stage and the purplish-pink blossoms add color during the late summer. It is best adapted to an area extending from Massachusetts through southern Pennsylvania and central Ohio, Indiana, and Illinois to the Kansas/Missouri border. The southern limit is northern Georgia, Alabama, and Mississippi.

Stands are easily established by drilling the seed into firm, well-prepared seedbeds. VA-70 will tolerate slightly acid, droughty sandy soils and grows well on clay loam soils with medium fertility. The shiny black seeds mature by October in New Jersey but earlier farther south.

The seed shatters shortly after maturing. The seeds are hard and slow to deteriorate even when in contact with moist soil. Seeds have been observed on the ground during the early spring. This makes VA-70 useful for ground feeding wildlife, especially in early spring when food is in short supply. The stems provide food for browsing animals such as deer.

Another strain of *Lespedeza thunbergii*, widely tested in the south, will be released within a year by the SCS plant materials center in Americus, Ga. The proposed name is 'Amquail'. It is for use in areas south of the normal range of VA-70. It is more woody, taller growing, and later maturing than VA-70. It is resistant to deer browse and root damage by pocket gophers, factors limiting the use of bicolor lespedeza in the South.

Mr. Belcher is manager, Cape May Plant Materials Center, SCS, Cape May Court House, N.J.
Mr. Sharp is plant materials specialist, Northeast Technical Service Center, SCS, Broomall, Pa.

'Sunglow' for Erosion Control

by Barbara L. Maus

'Sunglow' grayhead prairieconeflower (Ratibida pinnata) has been recently released as a cooperative research effort by the Soil Conservation Service; the Nebraska Agricultural Experiment Station, University of Nebraska, Lincoln, Nebr.; the Kansas Agricultural Experiment Station, Manhattan, Kans.; and the Nebraska Department of Roads.

The wildflower is adapted especially for the Midwest and grows best in Nebraska, Kansas, Oklahoma, Iowa, and Missouri and portions of South Dakota, Arkansas, and Minnesota.

Sunglow provides natural erosion control with a good root structure which holds the soil in place. When planted along with other varieties of wildflowers and grasses, it has great potential for stabilizing roadside rights-of-way, rest areas, parks, gardens, and recreation areas and for reestablishing prairie or natural areas.

Sunglow can be found growing on dry prairies and in open woods with tall and medium-height grasses such as big bluestem, indiangrass, switchgrass, and sideoats grama.

The plant grows from 20 to 60 inches tall with light-yellow blossoms that droop down around the top of a long, slender stalk. In the center of the flower, a spherical, slightly elongated disk looks toward the sun. The disk is grayish at blooming time and gradually turns to dark brown. The blooming season begins in the middle of June and continues until late August.

The perennial's stout, fibrous, deep roots do a good job of keeping soil in place while the flowers provide color and beauty to the landscape.

Ms. Maus is public information specialist, Midwest Technical Service Center, SCS, Lincoln, Nebr.

'Sunglow' grayhead prairieconeflower passed the test as a conservation plant at the SCS plant materials center in Manhattan, Kans.

The Plant That Came Out of the Cold

by George A. Brodie

Lupine, once a leading conservation cover crop in the Southeastern Coastal Plain, may be on the way back.

'Frost' lupine (Lupinus angustifolius), an improved variety of blue lupine, is more cold resistant than its predecessors which accounts for its growing popularity. It also has little bitterness and is believed to be more disease resistant than other lupine varieties.

The first plantings in Allendale and Barnwell Counties in South Carolina were made 6 years ago. There are now about 5,000 acres planted to Frost lupine in the two counties. Trial plantings were also made in several surrounding counties in the fall of 1977 and the results were generally good.

According to J. W. Rosier, a Barnwell County farmer, "The best planting time is in late September or early October." He pointed out that with mild winter temperatures the plants will reach maturity at 3 to 4 feet in time to plant soybeans.

"It's best to plant Frost lupine on your soybean land so that you can turn the crop under during full bloom if possible about 3 weeks before planting time," said Rosier.

"I've had some loss of plants due to cold weather and brown spot fungus," he continued. "But I'm not discouraged because temperatures during the winter of 1977–78 were as low as 14° F."

Rosier plants his lupine in 100-foot strips for wind erosion control as well as for a green manure crop. He uses 40 pounds of inoculated seed per acre.

It is recommended that soils be limed to a pH of 6.0 to 6.5 and phosphorus and potash should be in the high range.

Frost lupine, like its predecessors, is a heavy nitrogen-fixing plant. It is not uncommon for a good crop to fix 100 pounds or more of nitrogen per acre. It will also produce 2 to 3 tons of dry forage.

Field trials have shown that there is a tendency for nematode buildup and treatment should be considered if soybeans are to follow lupine. Its low alkaloid content makes it palatable to deer. Scattered trial plantings in heavily populated deer areas of the State have suffered severe damage from overbrowse.

Frost lupine was developed by the Georgia Agricultural Experiment Station, Tifton, Ga., and the Florida Agricultural Experiment Station, Gainesville, Fla., and was released in 1969.

Mr. Brodie is district conservationist, SCS, Barnwell, S.C.

Farmer Pete Rosier followed this planting of 'Frost' lupine with soybeans. The lupine serves to control wind erosion and as a green manure crop.

'Bobwhite' Is for the Birds

A wildlife soybean provides a feast for birds, large and small.

by Jimmy Henry and Richard R. Brown

At right, a handful of 'Bobwhite' soybeans shows the variation in size and color. The size variation makes it edible by large and small birds. Below right, if tall weeds are available, Bobwhite will climb them making seed harvest easier.

Wildlife can now be served a banquet rather than getting leftovers.

After several years of selection, 'Bobwhite' soybean (Glycine sp.) was released to commercial producers through the Missouri Seed Improvement Association. This release was the result of cooperative efforts by the Missouri Department of Conservation, the University of Missouri, and the Soil Conservation Service.

Bobwhite soybean produces seeds from 1/8 to 3/16 inch in diameter ranging in color from yellow to black. The variation in seed size makes it edible by both large and small birds, such as quail, turkey, pheasant, prairie chicken, and a host of songbirds.

It takes about 120 days for all the seed to mature, but seed maturation varies 3 to 4 weeks from the first mature seed to the last. This variability in seed maturity allows a wide geographic range of adaptability. The early maturing seed pods usually shatter readily; however, some pods retain seed well into winter. Thus wildlife is provided with a high-energy food for a long period of time.

Bobwhite soybean seed has been furnished to landowners in Iowa, Illinois, and Missouri for trial plantings to determine its area of adaptation. Well-established stands have perpetuated themselves for 3 to 5 years in northern Illinois and northwest Iowa and appear well adapted. This annual plant satisfactorily reestablishes from seed each year.

Good stands in Illinois and Iowa were lost in 1976 and 1977 due to weather extremes. In 1976 an early hard frost prevented development of viable seed. In 1977 an extremely dry summer in much of Iowa retarded growth of the beans so severely that few if any seeds were produced. These problems should not prevent the use of this valuable wildlife food plant.

Bobwhite soybeans should be established on a clean, well-tilled seedbed. Seeding can be made by broadcast, drill, or corn planter with small soybean plates. Herbicides used with field soybeans may be used to control weeds and allow a more vigorous stand the first year. A few broadleaf weeds do not severely limit the soybean because it will vine on plants growing nearby. Soybean vines have been measured up to 20 feet long. Five-foot vertical height is common.

Plantings have also been made alternating rows of soybeans with milo, millet, sudex, sudan, or other upright plants that could provide alternative food.

Site tolerance and fertility requirements are similar to field soybeans. Bobwhite will grow on sites with rather low fertility, but a much more vigorous stand can be maintained on deep, well-drained soils.

Management of the soybean, once established, is minimal. Some sites require little maintenance for several years; however, fertilizing, controlling weeds, and a light spring disking will result in a more productive food plot.

The plots need to be protected from livestock grazing. Deer, rabbits, and groundhogs have severely grazed some plots and appear to be the major problem in maintaining a stand.

Seed production is not difficult. It is desirable to have some tall weeds for the vining Bobwhite to climb. This raises the plants above the soil surface, making harvesting easier. In a weed-free plot, the plants will be quite close to the ground and many seeds will not be harvestable. There is always enough seed after harvest to regenerate the stand.

Seed is harvested by direct combining when the seed is mature and stems and leaves are dry. Seed yields at the SCS plant materials center, Elsberry, Mo., have ranged from 247 to 1,100 pounds per acre over 5 years. The average yield for the 5 years was 514 pounds per acre.

Bobwhite soybean was released in 1975 and seed was furnished to the Missouri Seed Improvement Association for planting in 1976. Commercial seed sources are not yet well established due to dry weather limiting seed production the past few years. Foundation seed is maintained at the Elsberry Plant Materials Center.

Mr. Henry is manager, Elsberry Plant Materials Center, SCS, Elsberry, Mo.
Mr. Brown is plant materials specialist, SCS, Columbia, Mo.

A Cold, Dry Reclamation Challenge

A coal company in Wyoming has put plants "on trial" to see if they can grow on mine spoil.

by Louis A. Engstrom
and Everet Bainter

A harsh climate and a complicated mining operation have not made surface mine reclamation easy for the Kemmerer Coal Company. But that hasn't stopped the company from making reclamation a part of its mining operation for the past 15 years.

The Kemmerer Coal Company has operated in southwestern Wyoming since 1897. Until 1950, the company mined underground but since then has worked open-pit mines.

The coal in the area is available because of the Rocky Mountain uplift and its faulting and erosion. If all the coal were in one seam, the seam would be 300 feet thick. The coal deposits, however, are in many different seams which, because of the uplifting, dip to the west at a 33 percent slope.

The quality of the coal varies from seam to seam and in order to supply an adjoining power plant with a uniform blend, the company now simultaneously mines 12 different coal seams ranging from 8 to 97 feet thick. In addition, some pits that were closed for economic reasons are now being reopened as the demand for coal increases.

Reclaiming areas interspersed with active mines, stored overburden, and stockpiles of topsoil requires tremendous coordination of all divisions of the company and makes reclamation complicated.

Early reclamation consisted of regrading spoil piles, acquiring seeding and mulching equipment, and establishing initial plantings of grasses. Success in the early years was limited because of a growing season of less than 90 days, annual precipitation of less than 9 inches, an average annual temperature of 40° F, and an average elevation of 7,300 feet.

In May 1975, the coal company, working through the Lincoln County Soil Conservation District, requested help from the Soil Conservation Service with trial plantings on mine spoil. The trials were set up to evaluate the suitability of commercially available grass species along with species being developed by the SCS plant materials center at Bridger, Mont.

In one trial, seven test strips were established on 6.8 acres. Grasses were planted on spoil with 6 inches of topsoil and were not fertilized. The grasses used were 'Fairway' crested wheatgrass, 'Critana' thickspike wheatgrass, 'Whitmar' beardless wheatgrass, 'Rosana' western wheatgrass, Mammoth wildrye, 'Sherman' big bluegrass, and mixtures of Rosana western and 'Nordan' crested wheatgrass.

The test strips were irrigated once in the late summer of 1975 and twice in the late summer of 1976.

All of the grasses were drilled except the wildrye which was broadcasted. After planting, 2 tons per acre of mulch was applied.

At the same time, another 3 acres of spoil with 6 inches of topsoil was planted to Rosana western wheatgrass, Critana thickspike wheatgrass, Whitmar beardless wheatgrass, and 'Wytana' fourwing saltbush. The same amount of mulch was applied with no fertilizer and no irrigation.

All of the grasses did well and continue to thrive. Critana thickspike wheatgrass and Rosana western wheat grass are particularly vigorous. They now produce more pounds per acre than adjacent native rangeland. Because of their rhizomatous nature, basal cover is also better and soil erosion on these reclaimed areas is actually lower than on native rangeland.

In one trial planting, a sprinkler system was used to irrigate the grass test strips late in the summer.

In addition to the trial plantings of grasses, the coal company is evaluating shrubs and woody species that were transplanted to mined areas. The native plants used included big sagebrush, aspen, serviceberry, and juniper. The plants have been successfully established.

The Kemmerer Coal Company is confident that it can meet the challenge of the cold, dry climate and return mined areas to desirable native vegetation.

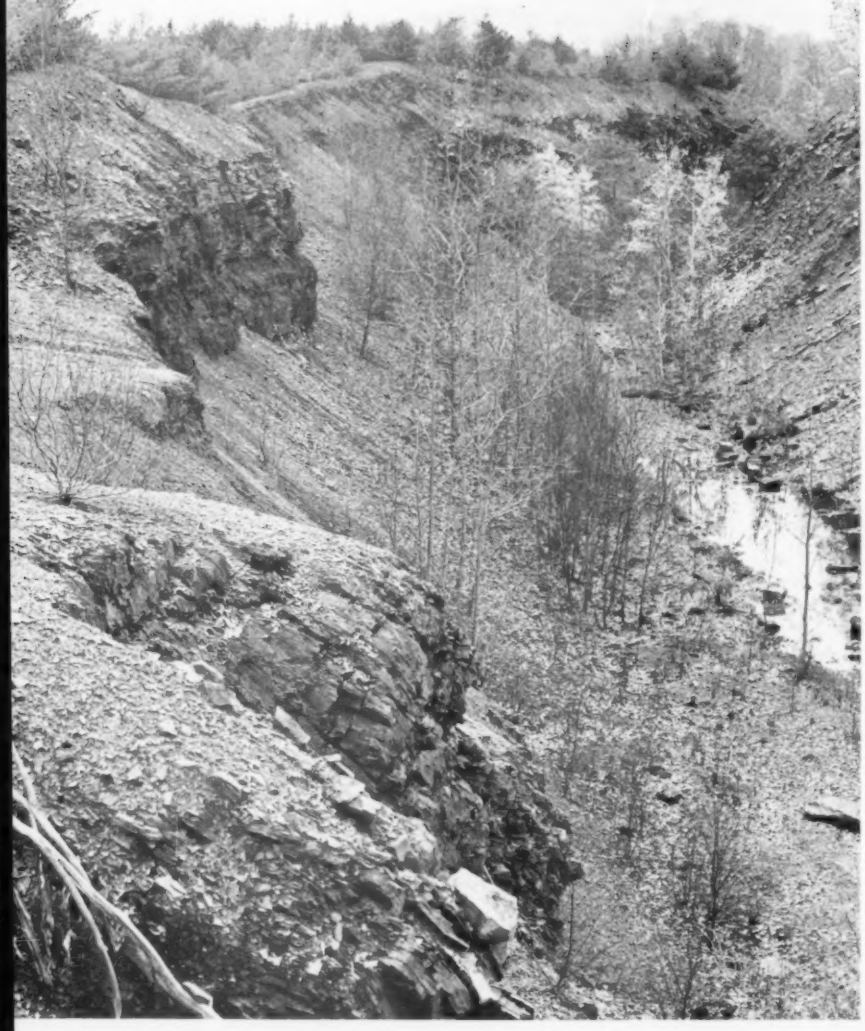
Mr. Engstrom is reclamation engineer, Kemmerer Coal Company, Kemmerer, Wyo.
Mr. Bainter is range conservationist, SCS, Kemmerer, Wyo.

Pennsylvanians are quick to take advantage of a new program to reclaim old mines.

RAMP: A Lift for Pennsylvania

by Graham T. Munkittrick

Below, typical abandoned mine site includes crumbling highwalls, stagnant water, and sparse plant growth.



The Rural Abandoned Mine Program (RAMP) is a boon to Pennsylvania. The State has 240,000 acres that have been mined for coal and abandoned or inadequately reclaimed. That is more than in any other State.

Some of this land is an eyesore. It pollutes water and air. It endangers the public health and safety. Now, for the first time, funds will be available to help landowners heal the worst of it.

RAMP provides technical and financial assistance for reclaiming abandoned surface mines and areas where past deep mining for coal has left dangerous problems at the surface. It is authorized by the Surface Mining Control and Reclamation Act of 1977 and administered by the Soil Conservation Service.

During the first signup period last February, 640 Pennsylvania landowners applied for assistance on 13,000 acres—more than twice as many as expected. On February 28, county newspaper headlines warned that it was the last day for RAMP signup. Some SCS offices stayed open until 9 p.m. receiving applications, and one office reported that people were lined up to the street waiting to apply.

Landowners whose applications are approved will sign 5- to 10-year contracts with SCS. We will help them develop reclamation plans and apply conservation measures to protect human life and property; reduce adverse effects to public health, safety, and general welfare; and stabilize the mined land, control soil erosion, reduce sediment, and enhance water quality.

The cost sharing provided by RAMP is an important new incentive. Local soil and water conservation districts and SCS have helped mining companies

and private landowners restore mined areas for many years. The cost of reclaiming many abandoned areas, however, has been prohibitive—as much as $10,000 an acre in some spots.

Through RAMP, the Federal Government will pick up 75 to 100 percent of the cost for reclaiming up to 120 acres and a smaller percentage for 121 to 320 acres.

SCS in Pennsylvania received $1.7 million in cost-sharing money for fiscal year 1979 and $0.8 million for technical assistance. The money will be allotted to reclamation projects on a "worst first" basis.

First priority will go to areas that present an imminent danger to life and property—including problems such as land subsidence, slides, burning gob piles near populated areas, and hazardous mine waste impoundments.

Priority 2 areas have adverse effects on the public health, safety, and general welfare, but generally are not as close to populated areas as the Priority 1 sites. The problems may be open dumps on mine spoil, hazardous highwalls, acid drainage or sediment, and eyesores in areas generally used by the public.

Priority 3 areas may not directly harm people or damage property, but they are so disturbed that they degrade the environment and cannot be used for any gainful purpose, such as pasture or woodland.

Determining which RAMP projects will be funded first requires careful judgment, and SCS feels that the choices of a team working together will be better than those any individual would make

The SCS district conservationist first investigates each site and places each RAMP application in the first, second, or third priority group. A local RAMP committee then reviews the assignments. The committee, appointed by the soil and water conservation district board, might include local representatives of the State Fish Commission, Bureau of Forestry, and Game Commission; a mine inspector; and a conservation district director.

A State RAMP committee then reviews the high-priority applications from each county and ranks the projects on a statewide basis. The State committee is made up of representatives from the State Association of Conservation Districts, the State Department of Environmental Resources, the coal industry, U.S. Department of the Interior's Office of Surface Mining, and others.

In the first signup, SCS received 235 Priority 1 applications covering nearly 5,900 acres; 253 Priority 2 applications covering 4,700 acres; and 152 Priority 3 applications covering 2,500 acres. During the next few years, we will be funding mainly Priority 1 projects, but we will begin planning reclamation work on some Priority 2 projects as well.

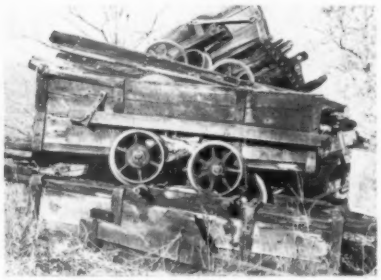
Of the 240,000 acres of abandoned mined land in Pennsylvania, about 60,000 acres have the kinds of problems that require RAMP assistance. For example, water in strip mine pits can percolate into ground water and reappear elsewhere as acid drainage. There already are too many acid streams in Pennsylvania. RAMP will help fill in these pits and improve drainage so that more water does not collect there.

Most RAMP sites will require a combination of plants and structural measures for effective reclamation. Two especially useful plants now available for planting were tested at SCS plant mate-

At right, many surface-mine spoil banks are steep, bare, and scarred with gullies.

A bulldozer constructs diversion terraces on restored strip mine land. The land will be returned to agricultural use.

Below, among the surface remnants of deep mining in Huntingdon County, Pa., is this junkpile of coal cars that donkeys once pulled.



Former SCS District Conservationist Dale Burns inspects good growth of 'Tioga' deer tongue, an excellent plant for healing surface-mined land.

rials centers in Quicksand, Ky., and Big Flats, N.Y. 'Tioga' deertongue, an acid-tolerant grass, is used to stabilize areas where very few other grasses will grow. 'Arnot' bristly locust, a thicket-forming shrub, spreads quickly and forms a ground cover under very acid conditions. It also produces cover for wildlife and attractive flowers.

Structural reclamation measures may include water diversions, stone-center waterways, and sediment basins to filter sediment in runoff. Some reclamation plans may call for temporary structures. For example, a landowner may install a diversion to protect the area until the vegetation is established. When the slope is stabilized, the diversion is smoothed out. Reclamation plans also may include soil grading, reconstruction, and soil amendments to create better conditions for plant growth. Wherever possible, landowners will use the soil material on the site for reclamation. Otherwise, costs will go up, and they will be left with two disturbed areas instead of one—the mine site and the area from which the material was "borrowed."

Under the Surface Mining Control and Reclamation Act, SCS and conservation districts also are cooperating with the Pennsylvania Department of Environmental Resources on reclamation assistance in active mining.

SCS provides technical assistance on the reconstruction of prime farmland. SCS also supplies soil surveys and provides technical assistance to mine operators to develop and apply reclamation plans as part of the mining process. This spring, for example, SCS and the State Association of Conservation Districts are conducting two series of training sessions—one for

The drag line is in the process of removing overburden to reach the coal seam. The bulldozer in the foreground is restoring the land to its original contour.

mine inspectors and another for mine owners and operators.

The State recently granted conservation districts authority to review and comment on all active mining reclamation plans. They also have review responsibilities under Pennsylvania's Clean Streams Law. Districts have been strongly interested in mined-land reclamation because they end up having to cope with the long-range environmental effects of surface mining. Most district directors want to help head off problems before they come home to roost. Thus, the fresh interest in RAMP and increased requests for technical assistance in planning reclamation for active mines are most welcome.

SCS, conservation districts, and mine operators will have to look at the long-term plans in each watershed. More than half of the streams in this State are polluted by minewaste discharges. I hope that we can use all of the conservation programs to do a cleanup job by watersheds. We will coordinate our efforts with programs such as Pennsylvania's "Operation Scarlift"—a mine reclamation program financed by State bonds—and with all other State and Federal agencies that have mine reclamation and land treatment programs. Together, we can achieve a total watershed approach.

We will make the reclaimed sites compatible with surrounding land uses—forest-to-forest and farmland-to-farmland. Stormwater control measures also will have to be included in reclaiming both active and abandoned mines. Last year, Pennsylvania passed a stormwater management law.

Last fall, I met with the SCS State conservationists of Ohio, Kentucky, and West Virginia to discuss RAMP and active mining programs. We want to develop a compatible approach to reclamation so that mining companies that work across State lines will have one set of guidelines.

The Surface Mining Control and Reclamation Act has done more than set up rules and regulations for mining companies. It has led to greater communication and cooperation among government agencies at all levels, conservation districts and other organizations, the coal industry, and local conservation contractors.

The extra communication and cooperation will bring about more—and more effective—reclamation to heal the scars and prevent others. The results will be a better environment and prouder communities throughout Pennsylvania and all other coal-producing States.

Mr. Munkittrick is State conservationist, SCS, Harrisburg, Pa.

What's a Priority 1 Site?

A typical Priority 1 abandoned mine site in Pennsylvania probably has these characteristics:

- Conditions at the site present substantial danger of harm to life or damage to property—as determined by field examination.
- There is no continuing responsibility by anyone to reclaim the area.
- The land is not under lease to be mined again in the foreseeable future.
- The site is about 40 acres. It is identifiable as a separate mined area. Some Priority 2 or 3 mined land may be nearby.
- The surface mine was cut deeply into the hillside; spoil piles and the surrounding hills are steep. Drainageways are narrow.
- The land has very little vegetative cover—perhaps low-grade timber at best—and probably is scarred with big gullies.
- The spoil piles are acid; so is the water that sits on or runs off the site; so is the adjacent stream.
- A highwall is sloughing off into the stream channel.
- There are very steep gob piles from deep mining on or near the area.
- Reclamation will cost several thousand dollars an acre.
- After reclamation the landowner probably will use the area mainly for wildlife habitat.

Water for All Seasons

by James W. Scott

Cool spring water during hot, dry summers and a flowing spring in below-freezing winters are a livestock owner's dream. The hot summer sun has little effect on the water temperature in spring-fed tanks and it is not uncommon on cold winter mornings to see steam rising from the same tanks since spring water is naturally "heated." It is a source of water for all seasons.

Lester Burkland of Olsburg, Kans., needed water for his cattle on a 75-acre pasture. He knew that he had a perennial spring in the bank of a gravelly draw near the pasture, but the soil and geology of the pasture were such that any dam constructed would probably leak. Burkland decided that developing the spring would be the best way to supply the water he needed for his cattle.

In May 1977, he applied for cost sharing for the spring development through the Agricultural Conservation Program administered by USDA's Agricultural Stabilization and Conservation Service. He also requested help from the Soil Conservation Service in designing the development and providing on-site inspection during and after construction.

When Burkland was ready to develop his spring, he hired a contractor with a track-driven high loader to do the job. The high loader scooped out the wet soil and prepared a trench for the collection pipe. The trench was cut down to shale. A section of 4-inch perforated PVC pipe was laid the full length of the spring seepage area, then the construction crew backfilled the trench with gravel.

The crew set a 6-foot joint of 24-inch-diameter corrugated metal pipe upright to serve as a spring box. They cut a 4-inch diameter hole in one side of the 24-inch pipe about 2 feet from the bottom and inserted the collection pipe. The supply pipe running into the tank fits into a 2-inch hole on the opposite side. About 2 inches of concrete was poured into the bottom of the 24-inch pipe. The crew then backfilled clay soil around the 24-inch pipe and compacted it to prevent seepage from the collection trench.

Burkland gets 10 to 15 gallons per minute flow into his stock tank. He expects the flow to be about 5 gallons per minute during a drought. He is satisfied that the spring will be a permanent, year-round water source.

Mr. Scott is district conservationist, SCS, Westmoreland, Kans.

Lester Burkland's livestock watering tank is full year round thanks to his spring development.

News Briefs

USDA–TVA Pact Targets Tennessee Erosion Problems

According to Agriculture Secretary Bob Bergland, the "time has come to get serious about controlling soil erosion and agricultural pollution before it threatens the very future of U.S. food production and our water supplies."

Bergland was speaking at a ceremony in Dyer, Tenn., in March marking a new cooperative agreement between the U.S. Department of Agriculture and the Tennessee Valley Authority. He said that soil erosion and the environmental problems associated with it are very serious and underrated national problems that are approaching the crisis stage.

"If the erosion challenge is not met quickly and forcefully," he said, "this Nation's unparalleled agricultural productivity will decline, water shortages will grow, and pollution from our farmland will diminish the country's water quality and the health of Americans." The signing of the agreement by Bergland and S. David Freeman, TVA board chairperson, brings together Federal, State, and local agencies in a concentrated single attack on soil losses and deteriorating water quality in one of the most severely eroding areas in the Nation.

Bergland said conservationists estimate that annual soil losses from erosion by water amount to 30 to 40 tons per acre of cropland in western Tennessee—six or eight times the national average—and in some counties where intensive farming methods are widespread, as much as 100 tons an acre.

Noting that topsoil is disappearing from many farms twice as fast as it can be replaced, Bergland said the "continued destruction of cropland is wanton squandering of an irreplaceable resource that invites future tragedy not only nationally, but on a global scale."

He said he was gratified by Tennessee's recognition of the urgent need to mobilize a comprehensive program to stem soil erosion and agricultural pollution.

The USDA–TVA agreement, Bergland said, reaffirms the commitment to residents of the Tennessee Valley region that they will receive full benefits from the services and programs offered by the two organizations.

"We share western Tennesseeans' concerns about their agricultural base, about their communities, and about the natural resources on which they depend," he said.

Bergland said a continued education effort, such as that being undertaken in the Tennessee Valley, is essential to persuade farmers that it is in their long-term interest to invest in soil and water conserving practices.

"Our biggest hope lies in new and innovative local approaches to conservation that are economical and long term," he continued. "We can assist, but we need fresh ideas for protecting resources to meet the needs and technology of the 1980's."

Although soil conservation programs, aided by the Federal Government, State agencies, and local conservation districts, have helped to keep erosion problems from becoming even worse, Bergland said, "we have not been the best or most consistent stewards of soil and water.

"We cannot afford to jump in and out of conservation every 5 or 10 years," he contended. "Conservation measures must be kept on the land permanently if we are to maintain our agricultural productivity.

"Time after time in recorded history, civilizations have flourished and then died because they failed to nurture their soil and water resources," he added. "There should be a lesson there for each of us."

USDA, EPA Agree on Rural Program Cooperation

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) renewed an agreement to share employees, funds, and facilities to clean up rural waterways, protect important farm and forest

lands from development, create sound pest control programs, and cooperate in other areas of mutual interest.

Last January, Agriculture Secretary Bob Bergland and EPA Administrator Douglas M. Costle signed a 5-year "memorandum of understanding" to pursue "common objectives, interests, and statutory requirements, and to avoid duplication of effort." The new agreement replaces a 1974 cooperative pact.

"Healthy soil, water, and air are essential to a healthy American agriculture," said Bergland, "so it's only natural that we work with EPA to protect these resources and to use them in environmentally acceptable ways."

"EPA relies upon USDA's experience with the needs of farmers to help us make decisions that benefit them as well as the public at large," Costle said. "The relationship between the agencies sometimes has been stormy in the past, but Bob Bergland and I have been working together on joint problems since our appointments 2 years ago."

Specifically, the agreement commits the two departments to share information, use one another's facilities, transfer funds, loan employees, and review one another's programs.

The agreement would allow the creation of joint "task forces" on research, land use, pest management, air and water cleanup, solid waste management, international programs, education and communication, and Federal-State cooperation.

An annual conference, chaired by the agency heads, would be used to monitor progress under the pact.

Landscaping With a Beautiful Redhead

by Jimmy Henry

'Flame' Amur maple (Acer ginnala) is an attractive, dense shrub or small tree that grows to a height of 15 to 20 feet and a crown width of 14 to 18 feet. It is multistemmed, branching at or near ground level, but it can be pruned to a single main stem if desired for landscaping.

Flame is one of the earliest woody species to leaf out in the spring and is fully leaved before blooming. The blossoms are yellow but inconspicuous, appearing usually the latter part of April to May 10th.

The double-winged fruits turn a bright red in the summer while leaves are still green. In the autumn the leaves turn a fiery red color, providing attractive scenery. The fruits have no wildlife value, but several bird species have been seen nesting in the branches.

Flame Amur maple has been released by the Soil Conservation Service at the plant materials center (PMC), Elsberry, Mo.

Seedlings of Flame Amur maple are easy to grow from seed and produce vigorous plants. It is also easy to establish seedlings in plantings such as those for landscaping, beautification, screening, farmstead windbreaks, and recreation areas. It has been tested in numerous field evaluation plantings in Iowa, Illinois, Missouri, North Dakota, Michigan, Nebraska, Oklahoma, and Kansas to determine its area of adaptation. Flame is extremely winter-hardy and has been planted with good survival as far north as Canada. It has also been planted as far south as southern Oklahoma and Tennessee.

Plantings of Flame perform well on a wide range of soil types but prefer medium to well-drained soils.

Propagation by commercial nurseries will be from open-pollinated seed.

Seed and plants to establish seed orchards of Flame were recently made available to commercial growers in limited quantities from the Elsberry PMC.

Mr. Henry is manager, Elsberry Plant Materials Center, SCS, Elsberry, Mo.

New Conservation Plants Released

The Soil Conservation Service and cooperating agencies released three new conservation plants during January and February 1979.

'Cimarron' little bluestem was released by the SCS plant materials center in Manhattan, Kans., for use in range and critical area seedings in western and central Kansas, the Oklahoma and Texas Panhandles, eastern Colorado, and southern Nebraska.

The SCS plant materials center in Elsberry, Mo., released 'Elsberry' autumn olive and 'Cling-Red' Amur honeysuckle for wildlife improvement, windbreaks and shelterbelts, screens or border plantings, and roadside beautification. Elsberry is adapted to Illinois, southern Iowa, Missouri, Kansas, and central and southeastern Nebraska. Cling-Red is adapted from New Jersey to Nebraska and from eastern Texas to North Dakota.

Research Roundup

Predicting Wind Erosion Protection of Range Grasses

Range conservationists now have a way of predicting susceptibility of grassland to wind erosion as well as estimating the grass cover needed for holding potential wind erosion to tolerable levels.

Management systems for controlling wind erosion on land devoted to principal crops are designed by use of a mathematical equation developed in 1965 by Neil P. Woodruff and Francis P. Siddoway, soil scientists of the U.S. Department of Agriculture.

Wind tunnel studies by Leon Lyles of USDA's Science and Education Administration now extend use of the equation to rangeland as well. Lyles' research furnishes information requested by USDA's Soil Conservation Service, a principal user of the equation.

The equation expresses potential soil loss as the interacting effects of soil erodibility, soil ridge roughness, the unsheltered distance across a field along the prevailing wind erosion direction, and vegetative cover.

Lyles, an agricultural engineer at Manhattan, Kans., has provided data for expressing erosion protection of range grass cover in terms required by the equation—that of an equivalent amount of small grain stubble lying flat on the soil surface in rows perpendicular to wind direction.

The agricultural research engineer found, for example, that the dry vegetation remaining after properly grazing buffalograss gives the same erosion protection as about eight times as much small grain stubble. Buffalograss was the most effective and big bluestem the least effective of eight perennial grasses when soil loss was measured in a wind tunnel during 5-minute exposure to a 30-mile-per-hour wind.

Other grasses tested individually or in mixtures included sideoats grama, western wheatgrass, needle-and-thread grass, little bluestem, switchgrass, and blue grama.

Two grass mixtures gave virtually identical erosion protection, Lyles found. One was 45 percent western wheat, 30 percent needle-and-thread, and 25 percent blue grama clipped to leave 4 inches of dry vegetation. The other was 45 percent blue grama, 30 percent buffalo, and 25 percent western wheat with 2 inches of dry vegetation.

A mixture in which big bluestem predominated, along with little bluestem and sideoats grama, gave less erosion protection.

Lyles ran tests simulating ungrazed, properly grazed, and overgrazed management levels and also devised a procedure for determining equivalent vegetative cover of other grasses or mixtures.

A Soil and Water Lab for Appalachia

Construction is underway on a new U.S. Department of Agriculture laboratory for the study of soil and water problems in the central and northern Appalachian region.

The new facility, to be administered by USDA's Science and Education Ad-

ministration (SEA), is located in Beckley, W. Va.

When completed, the Appalachian Soil and Water Conservation Research Laboratory will provide space and facilities for 16 research scientists plus 35 to 40 technicians, field workers, and other support staff. Facilities will include eight laboratories and six greenhouses, plus growth chambers, shops, and storage buildings on a 42.7-acre site.

Scientists at the Beckley laboratory will deal with a variety of problems associated with hill-land agriculture and reclamation of surface mined and other disturbed land. The research will have special application to revegetating surface mine spoils by developing practices to minimize soil and water loss from these areas.

Another research goal is to develop conservation cropping systems. One approach is no-tillage and other conservation tillage systems that aid in crop production and at the same time reduce soil and water losses. Another is establishing and maintaining legumes in hillside pastures, which may involve special seeding and fertilization techniques.

Scientists at the lab will also be working on methods to use water more efficiently. This is particularly important on the shallow soils and steep slopes that are typical of the Appalachian region. Ways will be developed to conserve the available water and to prevent water pollution from runoff and erosion.

Water and Nitrogen Management Take Extra Effort on Sandy Soil

Keeping fertilizer nitrogen where an irrigated crop can use it is not easy on sandy soil, U.S. Department of Agriculture research shows.

A study by Lloyd N. Mielke and James S. Schepers of USDA's Science and Education Administration identifies related fertilizer and water management problems with center pivot irrigation on sandy soil.

Whenever rainfall is greater than what can either be stored in the soil or used by the crop, some of the excess is likely to percolate down beyond the root zone, carrying nitrate–nitrogen with it. And that lost nitrogen is a potential ground water pollutant.

In addition, if more nitrogen than the crop can take up is put on in the spring or late in the growing season, nitrate–nitrogen may similarly be carried beyond the reach of roots.

The Lincoln, Nebr., soil scientists found that water and nitrate–nitrogen losses below the root zone followed similar patterns. But the nitrate–nitrogen concentration in the percolating water generally decreased as the season progressed.

On a Bellwood, Nebr., farm, corn under center pivot irrigation received 186 to 235 pounds of nitrogen annually in 1975–78. The farm operator generally put on preplant and starter fertilizer plus additional nitrogen in the water applied by center pivot. The added nitrogen was either a combination of anhydrous ammonia and 28-percent nitrogen solution or the nitrogen solution alone.

May through September rainfall reached the normal 19 inches for the area only in 1977, and was 5 to 9 inches below normal the other 3 years. Eleven to 14 irrigations per season added 9 to 13 inches.

With 23 to 28 inches of water received on the land by rainfall and irrigation, 2.2 to 3 inches percolated below the root zone in July and August, the scientists found. Seventeen to 44 pounds of nitrate–nitrogen per acre moved with it.

But 78 instead of 44 pounds of nitrate–nitrogen was lost in 1978 in percolating water where an extra 100 pounds per acre had been applied shortly after planting. The added nitrogen did not affect corn yield, demonstrating that amounts beyond crop needs may be lost.

The effects of more water than the soil could hold were illustrated in the wet spring of 1977, when more than 7 inches of rain fell from mid-May through June. Water loss by deep percolation during that time was 10 percent greater than the July–August total. But twice as much nitrate–nitrogen was carried below the root zone.

Center pivot systems are likely to be used on much of the land brought under irrigation in the future, Mielke and Schepers believe. Land topography will often not be well suited to surface irrigation. On sandy soil particularly, careful water and nitrogen management will be essential to profitable, pollution-restricting operations.

New Publications

Cooperative River Basin Studies: Helping Planners
by the Soil Conservation Service

What is a river basin study? Why is a river basin study needed? Who carries out the study? What information can a river basin study supply?

These are some of the questions answered in this 12-page, color brochure.

The brochure will be of interest to those who have responsibility for resource planning at the local, State, or national level. It will be useful for anyone who needs accurate technical data on the current and projected availability and condition of natural resources.

The publication explains who may request a river basin study and how the request is prepared and submitted. It also explains how the information provided by the study can be used.

Copies of the brochure are available from local or State Soil Conservation Service offices.

Montana Grazing Guides
by the Soil Conservation Service

A new publication is now available explaining time-tested and proven Soil Conservation Service guides to proper management of Montana's rangelands, grazable forests, and tame pastures.

This is the first time that SCS procedures and rationale for determining range site condition and suggested stocking rates have been collected into one publication.

The publication explains the goal of successful range management and the concept of different range sites based on a combination of soils and annual precipitation or forested grazing sites based on geographic area, soils, and forest overstory and canopy density.

There are 10 guides to range sites in five geographic areas of the State; nine guides to forest grazing sites in eight geographic or dominant forest species areas; three guides to nonirrigated tame pastures in three geographic areas; and three irrigated pasture management guides for different production units. All of the guides give some recommendations for stocking rates.

Maps of the different areas are included in the publication.

"Montana Grazing Guides" is available from the Soil Conservation Service, P.O. Box 970, Bozeman, Mont. 59715.

My Conservation Book
by the Baltimore County Soil Conservation District

A 34-page coloring book has been developed for elementary school children. Its purpose is to instill the basic concept of soil and water conservation and the importance of environmental balance in children at the third to sixth grade level.

The book is designed so that students can learn and have fun at the same time. It includes definitions of common conservation terms such as soil, sediment, watershed, and strip-cropping. Children can learn about the effects of soil erosion and where to look for it in their environment and what can be done about controlling erosion on farm, range, woodland, and in urban areas.

Included in the book is a section on conservation districts and the Soil Conservation Service. The book offers one exercise, for example, in which the children locate their local conservation district and find out the person in charge.

"My Conservation Book" can be purchased from the Baltimore County Soil Conservation District, 9811 Van Buren Lane, Cockeysville, Md. 21030. Price information is available from the conservation district.

Preserving America's Farmland
by the League of Women Voters

"Each year some 1 million acres of prime farmland—that is, land best-suited for producing food, fiber, and other crops—are converted to urban uses. Scattered development breaks up and isolates another million acres, making commercial farming of this land impractical. If this rate of conversion and checkerboarding continues, some experts think that our ready reserves of high-quality farmland could be depleted by the early 1990's."

This is the picture painted by the article on preserving important farmland. The publication outlines factors contributing to the loss of farmland, describes current State and local programs for preserving farmland, and evaluates the effectiveness of these efforts.

A section entitled "Federal Efforts to Preserve Farmland" includes actions taken by the U.S. Department of Agriculture, the Council on Environmental Quality, the U.S. Environmental Protection Agency, and Congress.

A short bibliography and a list of National Science Foundation studies in the area are also presented.

Copies of Publication No. 265 are available for 40 cents from the League of Women Voters of the United States, 1730 M Street, N.W., Washington, D.C. 20036.

List of Published Soil Surveys
by the Soil Conservation Service

This publication lists soil surveys that have been published by the U.S. Department of Agriculture since 1899. Information is given on how to obtain copies of surveys that are still in print and how to find out the current status of a soil survey not included in the publication.

Soil surveys provide soil maps and interpretations needed in giving technical assistance to farmers and ranchers; in guiding other decisions about soil selection, use, and management; and in planning research and disseminating the results of the research. They are also used in educational programs about soil use and conservation.

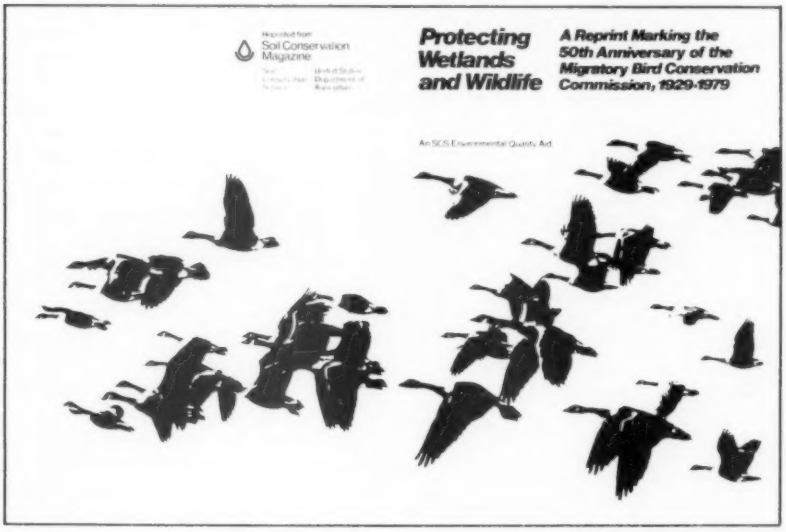
Copies of the list are available from local or State Soil Conservation Service offices.

Trees, Soils, and People
by the Soil Conservation Service

This publication is a collection of seven articles on trees and woodlands reprinted from *Soil Conservation* magazine. It includes articles about: managing a small woodland to provide material for a woodworking hobby; woodland management for long-term investment; managing trees and woodlands for esthetics, wildlife, and recreation; and managing field and farmstead windbreaks.

One of the articles describes a woodland management project that provided jobs and training to unemployed people and another gives information about forest-cutting and logging practices that help prevent erosion and improve water quality.

Single copies are available from local and State Soil Conservation Service offices.


Soil Conservation Magazine
Protecting Wetlands and Wildlife
A Reprint Marking the 50th Anniversary of the Migratory Bird Conservation Commission, 1929-1979

Protecting Wetlands and Wildlife
by the Soil Conservation Service

Ten articles from *Soil Conservation* magazine have been reprinted in this publication to commemorate the 50th anniversary of the Migratory Bird Conservation Commission.

The articles discuss conservation practices, such as windbreaks and farm ponds, that give wildlife a boost; the Water Bank Act, which aims to help landowners preserve, restore, and enhance wetland for use as wildlife habitat; and a wildlife conservation plan for a national wildlife refuge.

Other articles give information on specially designed ponds for waterfowl and other wildlife and "floating islands" to provide resting and nesting spots for waterfowl; converting surface mine pits into a marshland; suburban sediment ponds that became homes for wildlife; and a countywide project to erect wood duck nesting boxes.

Copies of this publication are available from local and State Soil Conservation Service offices.

An Uncommon Hold on Water

by Bruce C. Hennie

Top, waterline erosion is a common problem for many farm ponds, watershed structures, lakes, and streams in Texas and Oklahoma. Bottom, the thick root system of 'Shoreline' common reed controls erosion and stabilizes banks where the waterline remains constant during its first year's growth.

Erosion on earthen dams, ponds, and other waterline areas can be controlled by a new strain of common reed.

The Soil Conservation Service and the Texas Agricultural Experiment Station of Texas A. & M. University have jointly released 'Shoreline' common reed (Phragmites australis) to qualified growers. Not a seed-producing plant, it must be reproduced using rootstock plantings—what botanists refer to as rhizome propagation.

Shoreline has been extensively tested for more than 8 years in over 50 watershed areas and can grow on most soil types. It matures faster in areas having 30 or more inches of rainfall a year, but grows anywhere in Texas or Oklahoma where the waterline remains constant during its first year's growth.

The main conservation use of common reed is stabilizing the water's edge on ponds and lakes and around earthen dams. The thick rhizomes, or root system, hold soil in place, preventing erosion and weakening of the shoreline. The greatest success in SCS testing has been to combine Shoreline with 'Alamo' switchgrass. Common reed takes hold on the waterline and switchgrass provides ground cover a short distance inland.

As reflected in its name, common reed is one of the most common grasses in the world, growing mostly in marshes, along rivers, and at streamsides and canal banks. Shoreline is a horticulturally derived variety, developed from a natural strain discovered by SCS personnel on a railroad right-of-way in Kaufman County, Tex., in 1970.

Once established, Shoreline common reed lasts for years—its straight stems sometimes reach 10 feet in height, although a first year growth of

only 3 feet is common; its leafy blades range from 1/2 to 2 inches in width. The rhizomes will not take root when submerged; but once the plant stem has started to grow, water levels can be raised up to 2 feet from ground level.

The plant's most distinctive feature—branched, irregular flower clusters—turns a rich purple in the early weeks of autumn. By winter the graceful plumes turn a light tan.

An interesting sidelight to Shoreline is its historical role as a food supply for American Indian tribes. Backpackers and campers still think of common reed as a fine emergency food plant. The rhizomes are the most edible part. Roasted under ashes, their taste can be compared to the "jackets" of baked potatoes.

Cattle also like Shoreline and have destroyed stands by severe overgrazing. To maintain common reed for shoreline protection, SCS recommends preventing livestock from grazing it at any time. Wildlife often use Shoreline as cover, but do not graze the grass.

Farmers looking for ways to attract mallard, blue teal, or pintail ducks may be interested in common reed as nesting habitat. The ducks nest on dry ground at the edge of common reed stands.

Shoreline will be commercially available from at least two growers by 1980. Others who would like to establish production blocks of common reed rootstock should contact the SCS plant materials center in Knox City, Tex.

Mr. Hennie is public information specialist, SCS, Temple, Tex.

Meetings:

June	
3–7	American Institute of Architects, Kansas City, Mo.
4–8	General Federation of Women's Clubs, New Orleans, La.
5–7	The Garden Club of America, Milwaukee, Wis.
11–13	American Plywood Association, Portland, Oreg.
17–21	Outdoor Writers Association of America, Albuquerque, N. Mex.
24–27	American Society of Agricultural Engineers, Manitoba, Winnipeg, Canada
24–28	American Seed Trade Association, Inc., Washington, D.C.
24–29	Air Pollution Control Association, Cincinnati, Ohio
24–29	American Water Works Association Conference, San Francisco, Calif.
29–July 1	National Audubon Society Convention, Estes Park, Colo.
29–July 2	American Association of School Administrators, Denver, Colo.
July	
10	No-Tillage Systems Conference, Lexington, Ky.
14–28	National Association of Counties, Kansas City, Mo.
19–21	Izaak Walton League of America, Inc., Anaheim, Calif.
22–26	National Federation of Business and Professional Women's Clubs, Inc., Boston, Mass.
28–Aug. 1	American Association of Nurserymen and Southern Nurserymen's Association Convention and Horticultural Trade Show, Atlanta, Ga.
29–Aug. 1	American Agricultural Economics Association, Pullman, Wash.
29–Aug. 1	Land Application of Waste Materials Conference, Ottawa, Ontario, Canada
29–Aug. 1	Soil Conservation Society of America, Ottawa, Ontario, Canada
August	
5–8	National Farm & Power Equipment Dealers Association, Detroit, Mich.
5–10	Joint Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, Fort Collins, Colo.
12–16	Conservation Education Association, Dingmans Ferry, Pa.
19–22	American Institute of Chemical Engineers, Boston, Mass.

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